

# Consider Sensory Processing Disorders in the Explosive Child: Case Report and Review

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## ABSTRACT

**Introduction:** Children and youth with affect dysregulation (such as problems with explosive rage and anger) commonly present to health care professionals. **Method:** Standard DSM-IV differential diagnoses for affect instability include bipolar disorder, ADHD and oppositional defiant disorder. However, clinicians may wish to consider the possibility of sensory processing difficulties, which are difficulties with the processing of sensory input, which can lead to problems with under- or over-arousal, thus contributing to affect dysregulation. **Results:** In such cases, referral to occupational therapy may be helpful. Even in cases where occupational therapy is not available, being able to direct families to readings and internet resources about sensory processing may be helpful. **Conclusion:** This article presents the diagnosis and management of a case of sensory processing disorder, followed by a narrative review of the literature.

**Key Words:** Differential diagnosis, bipolar disorder, sensory processing disorder, explosive child

## RÉSUMÉ

**Introduction:** Les professionnels de la santé reçoivent fréquemment des enfants et des adolescents qui présentent des difficultés au niveau de la gestion des émotions (tels les problèmes avec explosions de rage et de colère. **Méthodologie:** Le DSM-IV fait état de telles situations dans les troubles bipolaires, le déficit d'attention avec hyperactivité et impulsivité et le trouble oppositionnel. Les cliniciens pourraient, dans de tels cas, vouloir envisager la possibilité à l'origine d'un processus sensoriel fautif (sous ou sur-stimulation) susceptible de conduire à une mauvaise gestion des émotions. **Résultats:** Une référence en ergothérapie pourrait alors être utile. Même quand une intervention en ergothérapie n'est pas faisable, le simple fait d'orienter les familles à lire sur le fonctionnement des émotions et l'impact des sens (processus sensoriel) sur celles-ci peut encore être utile. **Conclusion:** Cet article présente le cas d'un jeune avec un déficit du processus sensoriel, l'intervention effectuée, et une revue de littérature.

**Mots-clefs:** diagnostic différentiel, maladie affective bipolaire, trouble sensoriel, comportement explosif chez l'enfant

## INTRODUCTION

*"Picture yourself calm and relaxed. Suddenly, a stereo blasts in your ears, and you are punched in the arm. This would be frightening, painful and overwhelming. For someone with sensory processing problems, such auditory hypersensitivity might occur in a noisy classroom or hallway. Such touch hypersensitivity might occur with the routine jostling in a school corridor, or the accidental touching by a peer. In other words, every day life becomes overwhelming."*

Jason (not his real name) was a 9-yo boy referred to our tertiary care clinic for lifelong explosive rages. Due to his frequent, daily rages, he had been removed from a regular classroom. Teachers and caregivers reported that "everything" was a trigger.

Past mental health resources included psychiatrists, psychologists, child and youth care workers, special education teachers, and even an occupational therapist in the school focusing on motor interventions.

Prior diagnoses included bipolar disorder, ADHD, oppositional defiant disorder and non-verbal learning disability; he certainly had features in his history that could be seen as supporting each diagnosis. Previous psychopharmacologic treatment for bipolar, ADHD and oppositional defiant disorder had been unsuccessful, and had included mood stabilizers, psychostimulants, as well as both typical and atypical antipsychotic medication. Psychotherapy and counseling had been tried, with past interventions including anger management,

and even 'explosive child' approaches based on Ross Greene's Collaborative Problem-Solving model "(Greene, 2001)" (Greene, 2001).

Precipitants for his rages were "everything" and included:

Triggers such as sound and touch. Sound triggers included normal noisy situations, as seen on the school bus, playground, gymnasium or lunchroom. He'd often yell at peers, "Stop yelling at me!" even when peers were talking at a normal volume. Touch triggers included any accidental touching by others, which would lead to violence at his perceived attackers.

Any changes in routine, such as a change in order of his classes. His attempts to control situations led him to be seen as domineering and manipulative.

He had "good days" and "bad days" where he was able to cope (e.g. with background noise) on some days yet not on others, leading caregivers to believe that he "chose" to be intolerant on the bad days.

Since many of his triggers seemed to be sensory-related, he was referred to an occupational therapist with training in sensory processing approaches. The assessment, using standardized testing as well as clinical observations, revealed severe problems with sensory processing. Standardized testing included the sensory profile (Dunn, 1999) which provides a "standard method for professionals to measure a child's sensory processing abilities and to profile the effect of sensory profile on functional performance in the daily life of a child."

From a sensory processing viewpoint, it was felt that his

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problems with rages were due to his being under continual sensory overload. As a consequence of this overload, his nervous system perceived that he was in a constant state of danger, thus responding with ‘fight’ (rages, tantrums) or ‘flight’ (withdrawal, shutting down).

It became clear that his inflexibility and oppositionality reflected his body’s inability to self-modulate or regulate, and was in fact an attempt to keep things as predictable as possible. When routine changes, so do all the stimuli that a person has to deal with, and thus change can be overwhelming.

It also became clear that his inconsistent responses with “good days” and “bad days” was not intentional misbehavior, but rather the consequence of his neurological condition. Caregivers had a hard time understanding why a given trigger might have triggered him one day but not the next, so it was helpful for them to learn that it was more the accumulation of sensory input that exceeded his threshold, with the final trigger being the “straw that broke the camel’s back”.

Over six treatment visits with an occupational therapist, interventions to help reduce his sensory overload and help his nervous system modulate sensory input were implemented.

The overall hierarchy of strategies was:

- a) Ongoing assessment: following the initial assessment of his sensory profile, he had ongoing assessment of his reactions to environments and stimuli as sensory reactions can change over time.
- b) Education/awareness: teaching about sensory concepts as well as helping the child/caregivers become more aware of their own sensory needs.
- c) Coping strategies, which involves obtaining ‘occupational fit’ by a combination of: 1) Changing the environment so that it could meet his sensory needs (e.g. increase in some areas, decrease in others); 2) Changing the individual (e.g. teaching him techniques to modulate/regulate his responses, i.e. ‘modulation /regulation techniques’, and implementing a sensory diet, which is “a planned and scheduled activity program designed to meet a child’s specific sensory needs.” (Yack, Aquilla, & Sutto, 2003)

Specific strategies included:

- a) Strategies that would give him control over the amount of sensory input he had to deal with, thereby decreasing his stress and keeping him calmer throughout the day, which included:
- b) Giving regular breaks for him to seek out the relative quiet of a resource room or bathroom
- c) Allowing the use of earplugs
- d) Allowing the use of headphones with relaxing, masking music or sounds
- e) Flexibility about letting him avoid loud situations such as school buses, gymnasiums and school cafeterias

Within weeks of initiating various interventions with teachers and caregivers, Jason was calmer, more alert and focused, and therefore better able to learn and to deal with stress. He returned to a regular classroom, and finished his school year

with excellent grades, and was even given an award for being the ‘most improved’ student. The following year he entered a gifted program, and currently, at 2-years post discharge from our consultation clinic, he continues to do well. According to Jason and his mother, the pivotal turning point was reducing his sensory overload, so that he could actually benefit from counseling and therapy.

## **SENSORY PROCESSING AND AFFECT REGULATION IN NORMAL DEVELOPMENT**

Various theorists have noted the importance of sensory stimulation in normal development. Early sensory, motor and perceptual development forms a basic foundation, upon which later, higher stages of cognitive, socio-emotional development are based.

The concept of affect or emotional dysregulation (the inability to regulate one’s moods, feelings and emotions) has received increased attention in recent years (Bradley, 2000). Normally developing individuals exhibit an increasing ability for affect regulation as they mature, which allows them to cope with stresses such as:

- a) Threats to autonomy, e.g. through frustration of goal-directed behavior
- b) Threats to affiliation or connection to others, e.g. through loss or threat of loss (separation from caregivers, or conflict in relationships).

Since affect regulation is a higher order function, it makes intuitive sense that problems with affect regulation may result from problems with earlier developmental stages, such as sensory processing (de Gangi, Breinbauer, Doussard-Roosevelt, Stephen, & Greenspan, 2005).

## **PROBLEMS WITH SENSORY PROCESSING**

Problems with sensory function have been noted in the literature since the 1960’s and 70’s (Bogdashina, 2003), using terms such as ‘sensory perceptual impairments’, ‘sensory processing disorders/problems’, ‘sensory dysfunction’, ‘disturbances of sensory modulation/information processing’.

Early authors noted that in autism, there can be fluctuations between states of over- and underarousal resulting in a failure to modulate sensory intake adequately and an unstable perceptual experience (Ornitz & Ritvo, 1968); (Delacato, 1974). The individual’s sensitivity to stimuli fluctuates and is felt to be dependant on whether the person is in a state of over- or underarousal.

Bogdashina notes that many of these early concepts ‘re-appeared’ in the occupational therapy literature of the 1980s-90s as ‘new’ discoveries (Bogdashina, 2003). The term sensory integration dysfunction was coined by the occupational therapist Jean Ayres to describe atypical social, emotional, motor and functional patterns of behavior related to poor processing of sensory stimuli (Ayres, 1979). She proposed an intervention model using sensory stimuli in one domain to help another domain (e.g. using deep pressure/proprioceptive input to decrease tactile hypersensitivity).

Distinct sensory issues have been noted in ADHD (de Gangi et al., 2005) including tactile hypersensitivity (Parush, Sohmer, Steinberg, & Kaitz, 1997), and vestibular hyposensitivity

and dyspraxia (Mulligan, 1996). Some frequently (but not universally) observed issues include:

- a) Sensory overload in busy environments (e.g. classroom, malls, playgrounds)
- b) Auditory hypersensitivities
- c) Visual distractibility with difficulty screening out relevant from non-relevant visual stimuli, and poor coordination of eyes for focused report, e.g. easily overwhelmed by excess visual stimuli; problems following words while reading
- d) Tactile hypersensitivity
- e) High need for proprioceptive input (weight, pressure, traction), i.e. 'hyperactivity'
- f) High need for vestibular movement activities, i.e. 'hyperactivity'

### DIAGNOSTIC ISSUES

Affect regulation problems are a heterogeneous symptom cluster that can be the final common pathway for a variety of neurologic or psychiatric causes. Standard DSM-IV differential and comorbid diagnoses for affect instability include but are not limited to:

- a) Mood Disorders (Major Depressive Disorder, Bipolar Disorder)
- b) Anxiety Disorders (including Obsessive-Compulsive Disorders)
- c) Attachment Disorders
- d) Tourette's and Tic Disorders
- e) Attention-Deficit Hyperactivity Disorder
- f) Regulatory Disorders
- g) Developmental Coordination Disorder
- h) Learning Disorders (e.g. Non-Verbal Learning Disorder)
- i) Oppositional defiant disorder

Sensory processing problems are generally not mentioned in most lists of differential diagnoses of affect instability. However, as sensory processing problems may contribute to affect dysregulation, it is interesting that even recent bipolar treatment guidelines (Kowatch et al., 2005), makes no mention of sensory processing problems. This omission is particularly curious, given that bipolar disorder can be seen as a dysregulation syndrome (with affect as well as circadian dysregulation). Furthermore, sensory processing disorders appears to share similarities with some of the criteria for juvenile bipolar disorder. Item five, of the 'Core Phenotype – Research Diagnostic Criteria' for juvenile bipolar disorder (Papolos, 2005) is defined as:

Disturbance in the capacity to habituate to sensory stimuli often when exposed to novel, repetitive or monotonous sensory stimulation. A tendency to over-react to environmental stimuli and to become over-aroused, easily-excited, irritated, angry, anxious or fearful when exposed to novel sensory experiences, e.g., crowds, loud or unexpected sounds, (e.g., vacuum cleaners, ticking clocks, thunder and lightning), and dissonant sensations (e.g., shirt tags, fit of clothes or shoes, perceived foul odors). Child Bipolar Questionnaire (Questions 21-24).

Nonetheless, the lack of mention of sensory processing disorders is hardly surprising, given that there is not yet agreement on its existence as an independent diagnostic entity, and it is not yet recognized as an ICD-10 nor DSM-IV diagnosis.

Michael First (First, 2005), editor of the DSM-IV TR, notes that three options for adding sensory processing disorders to the DSM-V have been discussed: 1) adding it as a new disorder; 2) adding it as a subtype that would apply to disorders such as Autistic Disorder or Attention-Deficit / Hyperactivity Disorder; or 3) adding a dimensional definition to the DSM-V appendix for "criteria sets and axes needing further study" in order to stimulate additional research. He further notes that the type of data that would be required include 1) evidence that sensory processing disorder describes a condition that is not adequately covered by an existing DSM-IV disorder; 2) evidence supporting its diagnostic validity; 3) evidence supporting its clinical utility; and 4) evidence supporting that there is a low risk of false positive diagnoses that might result if sensory processing disorder were to be added.

The concept of sensory processing disorders also shows similarities with Regulatory Disorders, as listed in the DC03 (Diagnostic Classification for aged 0-3), a diagnostic system by the Zero to Three program for infants/toddlers. Regulatory Disorders are defined as difficulties in regulating behavior and physiological, sensory, attentional, motor or affective processes, and in organizing a calm, alert, or affectively positive state. The diagnosis of regulatory disorder involves both a sensory, sensory-motor, or processing difficulty and a distinct behavioral pattern indicated by one or more behavioral symptoms (de Gangi et al., 2005).

Examples of sensory hypersensitivity or over-responsiveness (which may then lead to sensory avoidant behaviors) include but are not limited to:

- a) Visual: sensitivity to bright light or fluorescent lights; troubles reading high contrast materials (e.g. black on white)
- b) Touch/tactile: sensitivity to light touch, e.g. bothered by clothes, or tags on clothing; seeking out deep pressure (e.g. squeezing him- or herself into tight places, lying under mattresses or heavy blankets)
- c) Oral: examples include sensitivity to food textures and having one's teeth (i.e. gums or mouth) brushed
- d) Sound/auditory: overly sensitive to noise, e.g. household appliances; easily distracted by noise, or makes own noise to mask out other sounds
- e) Movement/vestibular: sensitivity to movement, e.g. avoids swings, fast movement activities like biking, or becomes car sick easily
- f) Smell/olfactory: easily distressed or nauseated by smells, even ones that others may not notice

Examples of sensory hyposensitivity, or under-responsiveness (which may then lead to sensory seeking behaviors) include but are not limited to:

- a) Visual: seeking out visual stimulation, e.g. great attraction to light, great fascination and staring at

objects particularly moving objects, or fascination with mirrors or shiny objects

b) Touch/tactile: very touchy, enjoys messy activities; seeks out rough play; seeking out deep pressure (e.g. squeezing him- or herself into tight places, lying under mattresses or heavy blankets). Note that seeking out deep pressure can occur with touch hyper- and hyposensitivity

c) Oral: seeking out oral stimulation 1) to register, e.g. seeking out strong tasting foods so that taste can be registered such as spicy foods, or 2) to modulate, e.g. chewing and sucking on pens/pencils or other objects

d) Sound/auditory: seeks out noisy situations

e) Movement/vestibular: enjoys rough-and-tumble activities, seeks fast movement activities, able to spin without getting dizzy, needs to constantly fidget or move around; troubles sitting still

f) Smell/olfactory: seeking out smells, even to the point of seeking out distasteful sources of smells, e.g. feces

It is important to note that a child can present with both elements or hyper- and hyposensitivity.

## SENSORY INTERVENTIONS

Of note, is the fact that most people regularly employ self-regulation and sensory strategies without being aware of it. A common example is the experience of becoming drowsy while driving, or while reading a boring review article. Usual strategies employed may include increasing auditory stimulation (e.g. turning up the car stereo, or having background music), increasing vestibular movement stimulation (e.g. stopping the car and walking around) and increasing oral stimulation (e.g. chewing on gum, a pencil or getting something to eat/drink).

There is a paucity of randomized, controlled trials on the effectiveness of many child and youth mental health interventions, and the situation with sensory processing interventions is no different. Despite the lack of empirical research, there has nonetheless been an explosion of books (such as the popular *Out-of-Sync Child* book for parents), websites and workshops devoted to the topic. Judging by the numbers of parents and professionals exchanging information about sensory strategies, sensory-guided approaches appear to be helpful to at least some. Accordingly, this article will list some of the more common interventions mentioned in the sensory processing literature, as drawn primarily from occupational therapy sources (Bundy & Lane, 2002).

General principles include:

a) Developing a 'sensory diet', which is a carefully planned program to match each child's sensory profile

b) If a child is overloaded, then adapt (e.g. by lowering) sensory expectations or demands until the child is able to cope; teach the child self-modulation techniques

c) Once the child is able to cope, then sensory expectations or demands can be incrementally increased

d) Give advance warning about any changes or transitions, especially in school settings

e) For the hypersensitive child, the goal is to reduce excess sensory input

f) For the hyposensitive child, the goal is to increase sensory input

Specific interventions to reduce excess sensory input include the following:

a) Visual – using dimmed lighting; giving a child a refuge with dimmed lighting; using sunglasses or tinted glasses; seating at the front of the class; having a tidy desk; allowing a child to avoid eye contact when answering a question that requires concentration if s/he needs to “block off” his visual sense in order to focus

b) Touch – avoiding unexpected touch; avoid giving a child light touch, but instead give soothing firm touch and pressure (e.g. massage); in school, when lining up with peers, allow the child to be at the front or end of the line to avoid jostling with other children

c) Auditory – reducing sound stimulation, e.g. covering one's ears, earplugs; listening to soothing music; in general quiet, soft sounds are calming

d) Oral – seeking out certain textures, tastes to calm ourselves. Sucking on candies or through a straw can be calming

e) Movement – avoiding movement, or using soothing movement, in general slow continuous movement is calming (e.g. rocking in a rocking chair)

f) Teaching relaxation techniques (such as muscle relaxation and deep breathing) to help the nervous system stay calm. When calmer, a person is better able to handle stress (such as sensory stimuli)

Specific interventions to increase sensory stimulation include the following:

a) Visual – giving sources of visual stimulation, e.g. in a classroom teacher can give high contrast/brightly coloured handouts, use lots of hand gestures and movement when speaking, use different media to teach (movies, overheads, blackboard etc) to keep it visually interesting

b) Touch – allowing the use of hand “fidgets” in class to increase stimulation (e.g. objects to play around with such as a stress ball or koosh ball™); during free time, using tactile activities such as playdough™ or clay; use of differently textured washcloths to help wake up in the morning

c) Sound – background music to study, or background white noise/music to sleep

d) Movement – frequent breaks for the child to move around and stretch; use of unstable seating (such as inflatable 'ball' chairs) that permits the child to have movement; allowing the child to stand at their desk to complete work

e) Olfactory – incense or aromatherapy candles

f) Oral – chewing gum, hard candies, spicy foods, ice chips, water

Modulating activities are sensory interventions that appear

helpful whether one is under- or over-aroused, by helping the nervous system repair of sense of harmony/balance. Sensory modulation activities are often the first strategies taught to parents, as they can be helpful regardless of the child's sensory or arousal state. Examples include: Deep pressure or muscle work, e.g. massage, stretching, or moving (reasonably) heavy objects. Most people note that when overaroused (stressed or anxious), stretching is calming, yet when underaroused (bored and sleepy), stretching helps in alerting.

## CONCLUSION

Sensory processing problems seem to overlap numerous conditions, and there is uncertainty about whether it constitutes a distinct disorder or not. Anecdotal evidence suggests that sensory processing disorders may potentially play a large role in children and youth presenting with affect regulation problems. There is a need for research demonstrating the validity of the sensory processing disorders concept, as well as the clinical utility of sensory processing approaches and interventions. Clinicians may wish to consider the possibility of sensory processing difficulties, and consider referral to occupational therapy for assessment when appropriate. Even in cases where occupational therapy is not available, being able to direct families to readings and internet resources about sensory processing may be helpful.

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